CHAPTER 9

Management of Quality

Quality Management

- **Quality**
  - The ability of a product or service to consistently meet or exceed customer expectations (or specifications)
  - Prior to the 1970s and 1980s, quality was not a focal point of U.S. companies (due to lack of global competition)

Reactive vs. Proactive Quality

- **Quality Assurance**
  - Reactive
  - Emphasis is on finding and correcting defects before they reach the market

- **Strategic Approach**
  - Proactive
  - Focuses on preventing mistakes from occurring
  - Greater emphasis on customer satisfaction
  - Involves all manager and workers in a continuing effort to improve quality

Dimensions of Product Quality

- **Performance**—main characteristics of the product
- **Aesthetics**—appearance, feel, smell, taste
- **Special features**—extra characteristics
- **Conformance**—how well the product conforms to design specifications
- **Reliability**—consistency of performance
- **Durability**—the useful life of the product
- **Perceived quality**—indirect evaluation of quality
- **Serviceability**—handling of complaints or repairs

Dimensions of Service Quality

- **Convenience**—the availability and accessibility of the service
- **Reliability**—ability to perform a service dependably, consistently, and accurately
- **Responsiveness**—willingness to help customers in unusual situations and to deal with problems
- **Time**—the speed with which the service is delivered
- **Assurance**—knowledge exhibited by personnel and their ability to convey trust and confidence

Dimensions of Service Quality (contd.)

- **Courtesy**—the way customers are treated by employees
- **Tangibles**—the physical appearance of facilities, equipment, personnel, and communication materials
- **Consistency**—the ability to provide the same level of good quality repeatedly
Assessing Service Quality

- Audit service to identify strengths and weaknesses
- In particular, look for *discrepancies* between:
  1. Customer expectations and management perception of those expectations
  2. Management perceptions of customer expectations and service-quality specifications
  3. Service quality and service actually delivered
  4. Service actually delivered and what’s communicated to customers
  5. Customers’ expectations of the service provider and their perceptions of provider delivery

Determinants of Quality

- Quality of design
  - Intention of designers to include or exclude features in a product or service;
- Quality of conformance
  - The degree to which goods or services conform to the intent of the designers;
- Ease-of-Use and user instructions
  - Increase the likelihood that a product will be used for its intended purpose and in such a way that it will continue to function properly and safely
- After-the-sale service
  - Taking care of issues and problems that arise after the sale

The Consequences of Poor Quality

- Loss of business
- Liability
- Productivity
- Costs

Benefits of Good Quality

- Enhanced reputation for quality
- Ability to command higher prices
- Increased market share
- Greater customer loyalty
- Lower liability costs
- Fewer production or service problems
- Higher profits

Responsibility for Quality

- Top management
- Design
- Procurement
- Production/operations
- Quality assurance
- Packaging and shipping
- Marketing and sales
- Customer service

Costs of Quality

- Failure Costs: costs incurred by defective parts/products or faulty services.
- Internal Failure Costs
  - Costs incurred to fix problems that are detected *before* the product/service is delivered to the customer.
- External Failure Costs
  - All costs incurred to fix problems that are detected *after* the product/service is delivered to the customer.
Costs of Quality (continued)

- Appraisal Costs
  - Costs of activities designed to ensure quality or uncover defects

- Prevention Costs
  - All TQ training, TQ planning, customer assessment, process control, and quality improvement costs to prevent defects from occurring

Q: Relationships between quality and costs?

Ethics and Quality

- Substandard work
  - Defective products
  - Substandard service
  - Poor designs
  - Shoddy workmanship
  - Substandard parts and materials

Q: Having knowledge of this and failing to correct and report it in a timely manner is unethical.

Quality Contributors

- Walter Shewhart
  - "father of statistical quality control"
  - Control charts
  - Variance reduction

- W. Edwards Deming
  - Special vs. common cause variation
  - The 14 points; management is responsible, Deming Prize in Japan (1951)

- Joseph Juran
  - Quality Control Handbook, 1951, 80% controllable
  - Viewed quality as fitness-for-use
  - Quality trilogy—quality planning, quality control, quality improvement (1974)

Quality Contributors (contd.)

- Armand Feigenbaum
  - "Cost of nonconformance"
  - Quality is a "total field" not just a set of tools/technique
  - The customer defines quality

- Philip B. Crosby
  - Zero defects
  - Top management commitment
  - Quality is Free, 1979
  - Quality is Still Free, 1995

Quality Contributors (contd.)

- Kaoru Ishikawa
  - Cause-and-effect diagram (fishbone analysis)
  - Quality circles; Recognized the internal customer
  - Total Company Involvement (1972)

- Genichi Taguchi
  - Cost of poor quality
  - Taguchi loss function

- Taiichi Ohno and Shigeo Shingo
  - Developed philosophy and methods of kaizen (continuous improvement)

Quality Awards

Deming Prize

EFQM Excellence Award

Baldrige Award
**The Deming Prize**

- Honoring W. Edwards Deming
- Japan’s highly coveted award
- Main focus on statistical quality control

**European Quality Award**

- Prizes intended to identify role models
  - Leadership
  - Customer focus
  - Corporate social responsibility
  - People development and involvement
  - Results orientation

**Baldrige Quality Award Criteria**

- 1.0 Leadership (120 points)
- 2.0 Strategic Planning (85 points)
- 3.0 Customer and Market Focus (85 points)
- 4.0 Measurement and Analysis (90 points)
- 5.0 Workforce Focus (90 points)
- 6.0 Process Management (85 points)
- 7.0 Business Results (450 points)

**Quality Certification ISO**

ISO (International Organization for Standardization)

- ISO 9000
  - Set of international standards on quality management and quality assurance, critical to international business
- ISO 14000
  - A set of international standards for assessing a company’s environmental performance
- ISO 24700
  - Pertains to the quality and performance of office equipment that contains reused components

**ISO 9000: 2000**

- Quality Principles:
  - Principle 1 Customer focus
  - Principle 2 Leadership
  - Principle 3 Involvement of people
  - Principle 4 Process approach
  - Principle 5 System approach to management
  - Principle 6 Continual improvement
  - Principle 7 Factual approach to decision making
  - Principle 8 Mutually beneficial supplier relationships

**ISO 14000**

- ISO 14000 - A set of international standards for assessing a company’s environmental performance
- Standards in three major areas
  - Management systems
  - Operations
  - Environmental systems
ISO 14000

- Management systems
  - Systems development and integration of environmental responsibilities into business planning, including products and processes
- Operations
  - Consumption of natural resources and energy
- Environmental systems
  - Measuring, assessing and managing emissions, effluents, and other waste

Total Quality Management

A philosophy that involves everyone in an organization in a continual effort to improve quality and achieve customer satisfaction.

\[ T \rightarrow Q \rightarrow M \]

T=  
Q=  
M=  

The TQM Approach

1. Find out what the customer wants
2. Design a product or service that meets or exceeds customer wants
3. Design processes that facilitate doing the job right the first time
   \[ \text{pokayoke} = \text{fail-safing} = \text{fool proofing} \]
4. Keep track of results
5. Extend these concepts throughout the supply chain

Elements of TQM

- Continual improvement
- Competitive benchmarking
- Employee empowerment
- Team approach
- Decisions based on facts
- Knowledge of tools
- Supplier quality
- Champion
- Quality at the source Suppliers

Continuous Improvement

- Philosophy that seeks to make never-ending improvements to the process of converting inputs into outputs.
- Kaizen: Japanese word for continuous improvement or, literally, “change for the better”

Quality at the Source

The philosophy of making each worker responsible for the quality of his or her work.

Implications?
**Six Sigma**

- **Six Sigma**
  - A business process for improving quality, reducing costs, and increasing customer satisfaction
- **Statistically**
  - Having no more than 3.4 defects per million
- **Conceptually**
  - Program designed to reduce defects
  - Requires the use of certain tools and techniques

**Six Sigma Programs**

- Six Sigma programs
  - Improve quality
  - Save time
  - Cut costs
  - Etc.
- Employed in
  - Design
  - Production
  - Service
  - Inventory management
  - Delivery

**Lean Six Sigma**

- Lean Six Sigma
  - A balanced approach to process improvement that integrates principles from *lean operation* and statistical tools for variation reduction from six sigma to achieve *speed* and *quality*
  - An approach that is equally applicable to products and services
  - Early application in service support functions of General Electric and Caterpillar Finance

**Obstacles to Implementing TQM**

- Obstacles include:
  - Lack of company-wide definition of quality
  - Lack of strategic plan for change
  - Lack of customer focus
  - Poor inter-organizational communication
  - Lack of employee empowerment
  - View of quality as a "quick fix"
  - Emphasis on short-term financial results
  - Inordinate presence of internal politics and "turf" issues
  - Lack of strong motivation--
  - Lack of time to devote to quality initiatives
  - Lack of leadership

**Basic Steps in Problem Solving**

1. Define the problem and establish an improvement goal
2. Collect data
3. Analyze the problem
4. Generate potential solutions
5. Choose a solution
6. Implement the solution
7. Monitor the solution to see if it accomplishes the goal

**The PDSA Cycle**

- Plan-Do-Study-Act (PDSA) Cycle
  - **Plan**
    - Begin by studying and documenting the current process.
    - Collect data on the process or problem
    - Analyze the data and develop a plan for improvement
    - Specify measures for evaluating the plan
  - **Do**
    - Implement the plan, document any changes made, collect data for analysis
The PDSA Cycle

- Plan-Do-Study-Act (PDSA) Cycle
  - Study/check
    - Evaluate the data collection during the do phase
    - Check results against goals formulated during the plan phase
  - Act
    - If the results are successful, standardize the new method and communicate it to the relevant personnel
    - Implement training for the new method
    - If unsuccessful, revise the plan and repeat the process

PDSA for Problem Solving

PDSA for Process Improvement

7 Basic Quality Tools

- Flow Chart (process maps)
- Check Sheets
- Histogram
- Pareto Chart
- Scatter Diagram
- Cause & Effect (fishbone) Diagram
- Statistical Process Control and Run charts
Check Sheets/Lists

Wellington Fiber Board Co.

Checklists

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<th>Headliner Defects</th>
<th>Tally</th>
<th>Total</th>
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<tbody>
<tr>
<td>A. Tears in fabric</td>
<td>IIII</td>
<td>4</td>
</tr>
<tr>
<td>B. Discolored fabric</td>
<td>III</td>
<td>3</td>
</tr>
<tr>
<td>C. Broken fiber board</td>
<td>IIIII III III</td>
<td>36</td>
</tr>
<tr>
<td>D. Ragged edges</td>
<td>IIII</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>

Histograms (Bar Charts)

![Histogram for hole diameter data](image)

Pareto Analysis/chart

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Pareto Chart

80% of the problems may be attributed to 20% of the causes.

Scatter Diagram

![Example of a scatter diagram](image)

Cause-and-Effect (fishbone) Diagram

Quality Circles

- Quality Circle
  - Groups of workers who meet periodically to discuss ways of improving products or processes
    - Less structured and more informal than teams involved in continuous improvement
  - Quality circle teams have historically had relatively little authority to make any but the most minor changes
Benchmarking Process

- Identify a critical process that needs improving
- Identify an organization that excels in this process
- Contact that organization
- Analyze the data
- Improve the critical process

Operations Strategy

- Quality is a strategic imperative for organizations
- Customers are very concerned with the quality of goods and services they receive
- Quality is a never-ending journey
- It is important that most organizational members understand and buy into this idea
- Customer satisfaction ≠ customer loyalty
- Quality needs to be incorporated throughout the entire supply chain, not just the organization itself